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PEACE-ATHABASKA WEEDS

A RECONNAISSANCE APPRAISAL

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PEACE-ATHABASKA WEEDS

A RECONNAISSANCE APPRAISAL

A brief visit in October, 1929, to Beaverlodge in the heart of the Peace River country,* and three weeks more in the late summer of 1934 have afforded opportunity to become somewhat acquainted with the region and with its weed flora. A few days in 1935 were also given to examination of the Athabaska sector so far only traversed by rail.

The 1934 trip, the second in a projected quinquennial survey designed to preserve for at least one such area in Canada a more or less adequate weed history, was fortunate in the facilities provided for penetrating to almost all settled parts. This was due largely to the aid of Messrs. W. D. Albright, J. Travis and W. J. Thomson, of the Dominion, the British Columbia and the Alberta departments of agriculture respectively, and their interest and effort are deeply appreciated. The limited time allowed was conserved for study of the vegetation of settlement. Only incidentally in travel between prairies, was other plant cover much noticed. The native flora has always received major attention, first of the earlier explorers who would find little else, and later of botanists more intent upon phytogeographical and ecological problems than upon the influx of alien species. Recent botanists have been chiefly attracted to the still scarcely disturbed frontiers and beyond; whereas the primary concern of the agriculturist is to know the adventive plants, the manner of their advent and spread, and the prospect of retarding their increase in these new farming sections. In the lists so far published it is amazing what little mention there has been of weeds already becoming well naturalized.

The fruits of past botanical exploration are not, however, to be despised, even though they leave so much need for further weed survey. That same virgin flora is temporarily, and many elements of it long continue to be, the cover to be ousted by plants of cultivation and their attendant weeds; thus any survey is a contribution to weed survey. It is particularly opportune that a recent work on the botany of the Peace and Liard River regions,† and other published contributions from these hinterlands of Canada, by Dr. Hugh M. Raup, have brought together the valuable results of his own and earlier explorations in and beyond this area. This augments considerably the all too meagre results of the present trips; and what is of equal importance, it provides the support of authenticated records for many observations, which in a weed reconnaissance too hurried for much collecting of specimens, remain doubtful or with incomplete identification.

DEFINITION AND SCOPE

Some definition of terms employed will help to delimit and clarify the subject in hand preparatory to as brief a treatment of the materials under review as will suffice.

Peace-Athabaska.—Geographically this term indicates the extensive drainage basins of the Peace and Athabaska rivers; agriculturally it is restricted to a part of the upper or southern reaches of these rivers and their tributaries. Here the name is made to apply to the fairly homogeneous territory stretching

*Groh, Herbert. Grande Prairie weeds. Dom. Can. Dept. of Agr. Pamph. No. 117 New Series. 1930.

†Raup, Hugh M. Phytogeographic studies in the Peace and Upper Liard River regions, Canada. Contr. from the Arnold Arboretum of Harvard Univ. VI. 1934.

from the town of Athabaska on the east, to just beyond Montney, north of Fort St. John; and from the town of Peace River on the north, to somewhat short of Edmonton. There remain beyond these bounds settlements where plants can behave as weeds, as at Fort Vermilion; and there are wooded tracts alternating with the prairies within where the flora is but little weedy in character. Phytogeographically the area is reasonably common ground for study, and it comprises approximately what has been embraced in these weed surveys.

Weeds.—A weed has been defined as "a plant out of place," meaning of course, that in some person's estimation it is out of place. From the standpoint of the plant it is always in place when it can gain a foothold and meet the competition of other plants, adapt itself to the environment, and enjoy sufficient respite from human interference. As man sees it, some plants are always and only weeds, others are occasionally or in some circumstances weedy, and some, even of the most useful crop plants are weedy when they escape from cultivation or persist when their place is to be devoted to other uses. Some plants, moreover, are weeds not so much in an agricultural sense, as by reason of being directly harmful or poisonous to man or beast, or as being unsightly or in any way an occasion of trouble or expense. For present purposes a weed may be considered to be any native plant persisting, or any adventive plant encroaching in man's domain, in ways inimical to his interests.

Reconnaissance.—A reconnaissance survey is not a census in any degree. The enumeration of what is present on a quadrat or other limited area may be feasible, and has its uses for ecological and other special purposes, but is out of the question here. Only methods can apply which will gather a broad sweep of the information sought in a modicum of time.

It is not botanical survey in the stricter sense. Weed survey, which is all this can claim to be, relies as far as possible on previous botanical surveys, dispensing with much of the collecting of common and obvious species in favour of simple recording. The weed surveyor, be it understood, does not undervalue accuracy; but in much of his particular field the risks of inaccuracy are neither great nor serious, since weeds in general are the commonest and most readily distinguished of plants. Collecting is done chiefly in support of records of doubtfully identified, scarce, or otherwise notable plants of weedy character.

The surveys here presented are, as already intimated, the first of a series intended to follow developments as they unfold in a new field such as this. It is true that pioneer history has already been left behind for much of even this new north; but the present frontier settlements still present about the same setting, and beyond these may still be found the indigenous flora of the country, unmodified except by those ubiquitous vagrants that seem to dog the steps of even the trail-blazer—wild buckwheat, lamb's quarters, and other freely dispersed annuals.

The principal reconnaissance in 1934 extended through the three weeks commencing August 28. There was opportunity for fairly extensive, though never exhaustive, field work in each of the several prairies which go to make up the bulk of the developed lands, i.e. at High Prairie, in the McLennan-Falher district, in the extensive Peace River-Fairview-Dunvegan belt north of the river, at Beaverlodge and Hythe, at Pouce Coupé and Dawson Creek, and in the Fort St. John district, at that town and about Baldonnel, Rose Prairie, and for some distance north of Montney, as well as at Taylor Flat overlooking the river. Briefer forays were possible at many intermediate points. Moreover, useful observations of the more conspicuous and familiar weeds were made from the moving train or automobile; especially during stops, which allowed a certain amount of scrutiny of the environs of stations along the way or of highways and towns, excellent short lists could be secured. Frequently instead of a general

survey, some special environment as a crop or a weedy summer-fallow, was the basis for a list. Altogether 110 lists of varying length and character, and embracing among them practically all plant species distinguished in the course of that year's trip, entered into the study.

The Athabaska observations to and from the Peace, were reinforced in 1935 by trips to Barrhead and Athabaska, on which an excellent idea of intervening country was secured. These, together with the 1929 surveys, bring the total of lists to 174.

Appraisal.—While determining occurrence, surely a useful end in itself, weed survey goes a step farther, and availing itself of the constant repetition of lists, seeks to establish some measure of abundance, if not actual at least relative. In place of dependance on the indefinite " common," " scarce," " rare," etc., of popular parlance, there is possible a sort of index of frequency. Any particular weed will be found to have appeared in one, ten, or perhaps ninety per cent of the lists, indicating with some precision whether it is rare, occasional, or quite general in occurrence. Position, high or low in the lists, in a rough way recording prompt or merely chance observation of a plant's presence, can be some guide as well, but is a refinement of method probably unwarranted in view of other refinements lacking. Such appraisal as is secured must always be accepted with due reservations. To illustrate: common dandelion, at the height of early bloom, would be more heavily recorded than at another season when chiefly the prostrate foliage is in evidence. A little later when both fruit and flowers are to be seen, it might also be found that what appeared to be common dandelion is that and red-seeded dandelion together, neither one of which separately would rank so high. A further consideration would be that dandelion, while an undoubted nuisance in its own way, is not often the occasion of great losses in crops. The prevalence found, even supposing that all weeds could be equally conspicuous, in season, and uniformly distributed, is not, either, always the prime factor in weediness. Fireweed and yarrow, native plants unsurpassed for prevalence, are after all less dangerous than many new-comers, still sparingly recorded but ready to forge to a position of real menace.

The index of prevalence, while not an absolute measure of weediness or even of abundance, is at least something tangible and an approximation to the truth. Other attributes of plants which, together with abundance, may constitute them weedy, are difficult to assess in other than general terms based upon practical judgment. A prevalence percentage, however derived, is highly desirable information which the botanical manuals, when indicating range, can give scant light upon; and what they give can be valid for the time only, since weeds are ever on the march, and subject also to changes affecting agriculture itself.

General Considerations.—Those plants observed which are in no way to be regarded as weeds, are excluded from notice.

Weedy species are listed in two tables; first: those indigenous which tend to persist as weeds, or for other reasons belong in that category; second: those adventive or escaped from cultivation, and becoming naturalized and more or less weedy. In each case they are arranged in a descending order of prevalence; and for each of eight meridians from west to east a frequency percentage figure is given, or locality indicated for those infrequent.

Discussion of weeds follows in the sequence of the current botanical treatments. It is for the greater part an evaluation of the plant as a Peace-Athabaska weed, actual or potential. It is not to any great extent descriptive of the weed, nor of its control, since these are functions of the existing weed manuals.

Nomenclature has quite closely followed that adopted by Raup in his works on the vegetation of this part of Canada.

As a second report, though on a broader field, this treatment enlarges upon Pamph. No. 117, New Series, *Grande Prairie Weeds,* and in many cases repeats

the language of that report. Being essentially but another interim report, based on all too slight observation, it still anticipates the more detailed and critical investigation which should be possible at the third step in the project.

The several meridians may be designated as:

113—Athabaska district, east.
114—Athabaska district, west.
115—Lesser Slave Lake district.
116—High Prairie—McLennan district.
117—Falher and Peace River districts.
118—Grande Prairie, east—Spirit River and Fairview districts.
119—Grande Prairie district, west.
120—Pouce Coupé and Fort St. John districts.

TABLE I.—INDIGENOUS PLANTS PERSISTING AS WEEDS AND THOSE POISONOUS

Names in Order of General Prevalence	Duration	Frequency Percentage by Meridians							
		120	119	118	117	116	115	114	113
Common Yarrow..... *Achillea Millefolium* L.	P.	86	89	88	93	77	100	100	95
Fireweed. Great Willow-herb..... *Epilobium angustifolium* L.	P.	89	89	91	86	77	100	100	95
Wild Barley. Squirrel-tail..... *Hordeum jubatum* L.	B. or P.	67	78	91	86	77	89	94	89
Field Horsetail..... *Equisetum arvense* L.	P.	61	61	50	71	85	89	82	90
Biennial Wormwood..... *Artemisia biennis* Willd.	A. or B.	55	83	76	68	38	44	70	63
American Vetch..... *Vicia americana* Muhl.	P.	78	39	56	78	69	33	41	84
Peppergrass (admitted always as one species) *Lepidium apetalum* Willd.	A.	58	72	62	64	46	33	65	84
Wild Roses (inclusive of all native).... *Rosa* spp.	P.	80	55	50	57	61	44	65	63
Plantain (mostly if not all, the variety) *Plantago major* L. var. *asiatica* Decaisne.	P.	44	56	47	50	77	78	82	63
Knotgrass. Doorweed..... *Polygonum aviculare* L.	A.	67	77	62	46	38	56	42	32
Upright Cinquefoil..... *Potentilla norvegica* L. var. *hirsuta* (Michx.) Lehm.	A. or B.	64	66	32	43	54	33	76	53
Northern Bedstraw..... *Galium boreale* L.	P.	72	39	24	53	46	11	47	68
Slender Nettle..... *Urtica gracilis* Ait.	P.	44	44	18	39	61	89	53	79
Rough Hair Grass..... *Agrostis scabra* Willd.	P.	61	72	35	32	54	44	59	5
Kentucky Blue Grass..... *Poa pratensis* L.	P.	50	44	26	32	38	44	35	79
Goldenrod (Canada and others)..... *Solidago lepida* (*S. canadensis*), etc.	P.	53	39	23	46	54	44	41	42
Red Raspberry..... *Rubus idaeus* L. var. *canadensis* Richards.	P.	39	17	12	39	85	66	65	68
Canada Hawkweed..... *Hieracium canadense* Michx.	P.	53	39	44	53	31	22	35	16

TABLE I.—INDIGENOUS PLANTS PERSISTING AS WEEDS AND THOSE POISONOUS—*Continued*

Names in Order of General Prevalence	Duration	Frequency Percentage by Meridians							
		120	119	118	117	116	115	114	113
Western Rye Grass..... *Agropyron trachycaulum* (Link) Malte var. *typicum* Fern. (A. *tenerum* Vasey)	P.	47	44	41	43	38	22	18	10
Snowberry (no complete separation from wolfberry) *Symphoricarpos albus* (L.) Blake var.	P.	Very general distribution.							
Erect Knotgrass..... *pauciflorus* (Robbins) Blake *Polygonum erectum* L.	A.	44	44	38	25	15	22	12	68
Western Dock (with possibly some curled dock) *Rumex occidentalis* S. Wats.	P.	25	11	35	36	46	33	41	37
Western Sage or Mugwort..... *Artemisia ludoviciana* Nutt. (*A. gnaphalodes* Nutt.)	P.	11	33	67	21	15	0	47	42
Wolfberry..... *Symphoricarpos occidentalis* Hook.		General.							
Narrow-leaved Collomia..... *Collomia linearis* Nutt.	A. or W.A.	25	33	23	29	38	33	35	37
Cow Parsnip..... *Heracleum lanatum* Michx.	P.	33	17	20	18	8	33	35	79
Pale Dock..... *Rumex mexicanus* Meisn.	P.	14	33	32	32	38	11	35	37
Large-leaved Avens..... *Geum macrophyllum* Willd. var. *perincisum* (Rydb.) Raup	P.	36	33	12	18	62	66	23	21
Prairie Sage or Wormwood..... *Artemisia frigida* Willd.	P.	22	39	50	28	8	0	6	21
Wormseed Mustard..... *Erysimum cheiranthoides* L.	A. or W.A.	39	11	12	21	23	22	18	53
Northern Yarrow..... *Achillea sibiricum* Ledeb.	P.	25	17	17	25	31	33	29	52
Yellow Avens..... *Geum strictum* Soland.	P.	33	22	6	14	31	11	24	58
Water Parsnip..... *Sium suave* Walt.	P.	11	22	20	25	54	33	29	26
Wood Horsetail..... *Equisetum sylvaticum* L.	P.	55	22	9	11	38	22	23	26
Harebell. Bluebell..... *Campanula rotundifolia* L.	P.	39	44	18	25	0	0	18	5

Slough Grass. *Beckmannia Syzigachne* (Steud.) Fern.	P.	14	39	15	32	38	0	12	21
Wild Pea. Pale Vetchling. *Lathyrus ochroleucus* Hook.	P.	33	11	0	21	55	0	24	37
Ragwort. *Senecio eremophilus* Richards.	P.	50	11	9	7	23	11	6	5
Awned Wheat-grass. *Agropyron trachycaulum* (Link) Steud. var. *unilaterale* (Cassidy) Malte (*A. caninum* (L.) Beauv.)	P.	28	22	12	18	23	11	18	5
Silverberry. *Elaeagnus argentea* Pursh.	P.	Chiefly prairie distribution.							
Blue Lettuce. *Lactuca pulchella* (Pursh), DC.	P.	17	6	12	43	38	0	0	10
Hedge Nettle. *Stachys scopulorum* Greene.	P.	22	22	0	21	46	0	12	21
Canada Fleabane. *Erigeron canadensis* L.	A.	14	22	12	18	8	0	47	16
Tall Larkspur. *Delphinium scopulorum* Gray var.	P.	30	11	3	7	15	0	18	37
Cat-tail. *Typha latifclia* L.	P.	0	0	12	21	38	22	24	32
American Dragonhead. *Dracocephalum parviflorum* Nutt.	B. or A.	28	11	3	35	23	0	6	10
Fowl Meadow Grass. *Poa palustris* L.	P.	Quite general distribution.							
Drummond's Thistle. *Cirsium Drummondii* T. &. G.	P.	25	22	9	21	23	0	0	0
Everlasting. *Antennaria* spp.	P.	Chiefly prairie distribution.							
Strawberry Blite. *Chenopodium capitatum* (L.) Asch..	A.	30	22	3	18	8	0	0	5
Marsh Cress. *Rorippa palustris* (L.) Bess. var. *glabrata*. (Lunell) Victorin	A. or B.	General in moist situations.							
Northern Willow-herb. *Epilobium glandulosum* Lehm. var. *adenocaulon* (Haussk.) Fern.	P.	In moist situations.							
Meadow Horsetail *Equisetum pratense* Ehrh.	P.	Scattered throughout.							
Tall Buttercup. *Ranunculus acris* L.	P.	0	0	0	0	23	44	29	53
Blue-joint. Western Couch Grass. *Agropyron Smithii* Rydb.	P.	11	11	23	14	8	0	0	16
Cranesbill. Wild Geranium. *Geranium Bicknellii* Britton	A.	Especially in recently burned areas right across.							
Golden Corydalis. *Corydalis aurea* Willd.	B.	33	11	3	14	0	0	0	10
Canada Mint. *Mentha canadensis* L.	P.	6	22	3	18	31	0	12	10

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TABLE I.—INDIGENOUS PLANTS PERSISTING AS WEEDS AND THOSE POISONOUS—*Continued*

Names in Order of General Prevalence	Duration	Frequency Percentage by Meridians							
		120	119	118	117	116	115	114	113
Orache *Atriplex patula* L. (incl. var.)		In saline places especially.							
Maple-leaved Goosefoot *Chenopodium hybridum* L.	A.	33	0	6	11	0	0	0	10
Rattlebox *Rhinanthus Kyrollae* Chabert.	A.	28	17	12	7	0	0	0	0
Hedysarum *Hedysarum Mackenzii* Richards		Especially westward.							
Showy Locoweed or Oxytrope *Oxytropis splendens* Dougl.	P.	11	17	9	25	8	0	0	0
Indian Paint-brush *Castilleja miniata* Benth.	P.	Especially in "prairie".							
Red Osier Dogwood *Cornus stolonifera* Michx.	P.	Quite generally distributed.							
Milk Vetch *Astragalus hypoglottis* L.	P.	Rather general on "prairie".							
Silverweed *Potentilla Anserina* L.	P.	0	22	0	4	8	11	18	37
Tall Cinquefoil *Potentilla arguta* Pursh.	P.	Peace River Block			Scattered.		L. Slave L. dist. (Brinkman)		Athabaska dist.
Canada Anemone *Anemone canadensis* L.	P.	0	0	0	0	15	0	18	64
Gumweed *Grindelia squarrosa* (Pursh) Dunal.	P. or B.	Pouce Coupé	Wembley Beaverlodge	Fairview Spirit River Dunvegan (J. M. Macoun)	Grimshaw Peace River	Kenzie			Athabaska
Philadelphia Fleabane *Erigeron philadelphicus* L.	P.	3	0	0	4	23	0	12	42
Crested Hair-grass *Koeleria cristata* (L.) Pers.	P.	Widely distributed.							
Spreading Dogbane *Apocynum androsaemifolium* L.	P.	8	0	3	21	8	0	0	10
Field Chickweed *Cerastium arvense* L.	P.	Rose Prairie Dawson Creek (Raup)	Beaverlodge	Fairview	Falher				
Blue-eyed Grass *Sisyrinchium angustifolium*. Miller	P.	8	6	0	4	8	0	6	32

Beggar-ticks,..... *Bidens cernua* L.	A.	Baldonnel	.....	Prestville	Eaglesham	High Prairie McLennan	L. Slave L. dist. (J. Macoun)	Smith	
Western Choke Cherry..... *Prunus demissa* (Nutt.) Dietr.	P.	Taylor Flat (Raup) Peace River Block	.....	.....	Peace River Watino		L. Slave L. dist. (Brinkman)		
Nodding Chickweed..... *Cerastium nutans* Raf.	A.	19	6	0	4	0	0	6	5
Sweet Grass. Holy Grass..... *Hierochloa odorata* (L.) Wahl.	P.	Baldonnel Taylor Flat (Raup)	Hythe		Grimshaw Falher			Barrhead	Athabaska dist.
Pale Comandra..... *Comandra pallida* A. DC.	P.	Pouce Coupé Taylor Flat (Raup)			Brownvale Peace River Landing (J. M. Macoun)	.....	.....	.....	Athabaska dist.
Red Baneberry (white-fruited once).. *Actaea rubra* (Ait.) Willd.	P.	22	6	0	0	8	0	0	0
Androsace..... *Androsace septentrionalis* L.	A.	Rose Prairie Dawson Creek (Raup)	Beaverlodge	.....	.....	.....	L. Slave L. (J. M. Macoun)		
Owl's Clover..... *Orthocarpus luteus* Nutt.	A.	0	22	6	14	0	0	0	0
Whitlow-grass..... *Draba nemorosa* L.	W.A.	0	0	0	4	8	0	12	31
Small-flowered Buttercup..... *Ranunculus abortivus* L.	B.	Rose Prairie Fort St. John Baldonnel	.....	.....	.....	.....	L. Slave L. dist. (Brinkman)	Barrhead	Athabaska
Milk Vetch..... *Astragalus adsurgens* Pall.	P.	.....	Hythe	.....	Peace River Landing (J. M. Macoun)				
Golden Dock..... *Rumex maritimus* L. var. *fueginus* (Phil.) Dusén.	A.	Rose Prairie	Beaverlodge	Sexsmith N. of Spirit River (J. M. Macoun)	Donelly	McLennan	L. Slave L. dist. (Brinkman)		
Marsh Foxtail..... *Alopecurus aequalis* Soleil.	P.	North Pine Baldonnel Pouce Coupé	.....	.....	Falher				
Feather Bunch-grass..... *Stipa viridula* Trin.	P.	.....	.....	Esher Fairview Dunvegan (J. M. Macoun)	Peace River				

TABLE I.—INDIGENOUS PLANTS PERSISTING AS WEEDS AND THOSE POISONOUS—*Continued*

Names in Order of General Prevalence	Duration	Frequency Percentage by Meridians						
		120	119	118	117	116	115	114	113
Bird Cherry *Prunus pennsylvanica* L. f.	P.	Taylor Flat (Raup)	Beaverlodge		Judah Roma Peace River	.....	L. Slave L. dist. (Brinkman)	Smith	
Marsh Marigold *Caltha palustris* L.	P.	.....	Beaverlodge (Albright)	..... Manir	Peace River Landing (J. M. Macoun)	Kenzie McLennan	.....	.....	Athabaska dist.
Erigeron *Erigeron glabellus* Nutt.	P.	Taylor Flat (Moss)	Beaverlodge	.....	Peace River Landing (J. M. Macoun)				
Linear-leaved Wormwood *Artemisia dracunculoides* Pursh.	P.	.....	Beaverlodge	Spirit River	Watino				
Cut-leaved Anemone *Anemone multifida* Poir. var. *hudsoniana* DC.	P.	Taylor Flat (Raup) Dawson Creek	Hythe Beaverlodge	.....	Peace River	.....	.....	.....	Athabaska
Long-plumed Purple Avens *Geum triflorum* Pursh.	P.	Dawson Creek Rose Prairie Taylor Flat (Raup)	Hythe Beaverlodge	Fairview	Peace River	.....	.....	.....	Colinton
Small-flowered Prairie Rocket *Erysimum parviflorum* Nutt.	.....	Dawson Creek (Raup) Taylor Flat	Beaverlodge	.....	Peace River Landing (J. M. Macoun)	High Prairie	.....	.....	Athabaska
Spear-leaved Goosefoot *Monolepis Nuttalliana* (Schultes) Greene	P.	North Pine	Beaverlodge	Dunvegan	.....	McLennan	.....	.....	Clyde
Gray Tansy Mustard *Sisymbrium Hartwegianum* Fourn.	A.	Fort St. John	.....	..Fairview	Peace River	.....	.....	.....	Athabaska dist.
Agrimony *Agrimonia striata* Michx.	P.	.....	.....	.....	.....	High Prairie	Kinuso	Wagner	Athabaska dist.
Evening Primrose *Oenothera sp.*	B.	.....	.....	.....	Berwyn	.....	.....	.....	Athabaska dist.
Great Ragweed *Ambrosia trifida* L.	A.	Pouce Coupé	.....	.....	Berwyn Brownvale Peace River				
Wild Cucumber *Echinocystis lobata* T. & G.	A.	.....	.....	.....	Peace River	High Prairie	.....	.....	Athabaska dist.

Western Water Hemlock *Cicuta occidentalis* Greene.	P.	Rose Prairie	Demmitt Beaverlodge	Grande Prairie					
Arrow-grass *Triglochin maritima* L.	P.	.....	.....	.....	Peace River Landing (J. M. Macoun)	.....	.....	.....	Athabaska dist.
Thimbleweed *Anemone cylindrica* A. Gray.	P.	Peace River Block	Beaverlodge						
Scouring Rush *Equisetum hyemale* L.	P.	.....	Dimsdale						
Celery-leaved Buttercup *Ranunculus sceleratus* L.	A. or W.A.	.....	Hythe	.....	.....	.....	L. Slave L. dist. (Brink- man)	.....	Athabaska dist.
Tower Mustard *Arabis glabra* (L.) Bernh.	B.	Taylor Flat (Raup)	Beaverlodge						
Nodding Wild Onion *Allium cernuum* Roth.	P.		Beaverlodge	Dunvegan (J. Macoun)	Peace River				
Diffuse Cinquefoil *Potentilla millegrana* Engelm.	A.	.....	.....	.....	Falher				
Purslane Speedwell *Veronica peregrina* L. var. *xalapensis* (H.B.K.) Pennell	A.	.....	Beaverlodge	.....	Falher	.....	.....	.....	Clyde
Creeping Juniper *Juniperus horizontalis* Moench.	.....	Taylor Flat (Raup)	.....	.....	Peace River				
Three-flowered Nightshade *Solanum triflorum* Nutt.	A.	Taylor Flat							
Black Nightshade *Solanum nigrum* L.	A.	Taylor Flat	Beaverlodge						
Toad Rush *Juncus bufonius* L.	A.	.....	.....	.....	.....	.....	Widewater		
Pale Persicary *Polygonum lapathifolium* L.	A.	.....	.....	.....	Berwyn		L. Slave L. dist. (Brink- man)		
Narrow-leaved Puccoon *Lithospermum incisum* Lehm.	P.	.....	.....	.....	Peace River				
Red Goosefoot *Chenopodium rubrum* L.	A.	.....	.....	.....	Peace River				
Bulb-bearing Water Hemlock *Cicuta bulbifera* L. (one plant)	P.	.....	.....	.....	.....	McLennan			
Missouri Goldenrod *Solidago missouriensis* Nutt. var. *montana* Gray.	P.	.....	Beaverlodge	Dunvegan (J. M. Macoun)					
Jewel-weed *Impatiens Noli-tangere* L.	A.	Fort St. John (Moss) Taylor Flat					Faust (Moss) L. Slave L. dist. (Brink- man)		

TABLE I.—INDIGENOUS PLANTS PERSISTING AS WEEDS AND THOSE POISONOUS—*Concluded*

Names in Order of General Prevalence	Duration	Frequency Percentage by Meridians							
		120	119	118	117	116	115	114	113
Arrow-grass *Triglochin palustris* L.	P.	Montney							
Low Juniper *Juniperus communis* L. var. *montana* Ait.	P.	Taylor Flat (Raup)	.....	.....	Peace River				
Thyme-leaved Spurge (one infestation on railway) *Euphorbia serpyllifolia* Pers.	A.	.....	.....	.....	Peace River				
Wild Oat-grass *Danthonia* sp.	P.	Fort St. John (Macoun, 1875)	Beaverlodge						
White Marsh Marigold *Caltha natans* Pall.	P.	Rose Prairie	.....	.....	Peace River Landing (J. M. Macoun)	.....	L. Slave L. dist. (Brinkman)		
Pasque flower. Crocus Anemone *Pulsatilla ludoviciana* (Nutt.) Heller.	P.	Taylor Flat (Raup)	.....	.....	.....	.....	.....	.....	Athabaska dist.
Tall Anemone *Anemone riparia* Fern.	P.	Fort St. John	.....	.....	.....	.....	L. Slave L. dist. (Brinkman)		
Rayless Aster (railway yard) *Aster angustus* (Lindl.) T. & G.	A.	.....	.....	.....	Peace River				
Water Arum *Calla palustris* L.	P.	.....	.....	.....	.....	.....	L. Slave L. dist. (Brinkman)	Tieland	
Dwarf Mistletoe (on lodgepole pine) *Arceuthobium americanum* Nutt.	P.	Dawson Creek	.....	.....	.....	.....	L. Slave L. dist. (Brinkman)		

TABLE II.—ADVENTIVE AND ESCAPED PLANTS APT TO BE WEEDY

Names in Order of General Prevalence	Duration	Frequency Percentage by Meridians							
		120	119	118	117	116	115	114	113
Timothy *Phleum pratense* L.	P.	58	83	88	75	69	100	88	90
Lamb's Quarters *Chenopodium album* L.	A.	88	78	76	82	54	45	65	o8
Common Dandelion (with undistinguished red-seeded dandelion) *Taraxacum officinale* Weber.	P.	42	39	62	68	92	77	76	100
Shepherd's Purse *Capsella Bursa-pastoris* (L.) Medic.	A. or W.A.	72	72	65	39	54	55	53	68
Russian Pigweed *Axyris amarantoides* L.	A.	30	39	59	60	46	66	76	79
Alsike Clover *Trifolium hybridum* L.	P.	20	44	47	43	61	55	65	95
Wild Buckwheat *Polygonum Convolvulus L.*	A.	72	55	41	50	38	0	29	47
Awnless Brome Grass *Bromus inermis* Leyss.	P.	36	55	56	36	23	0	24	74
Pineappleweed *Matricaria matricarioides* (Less.) Porter.	A.	39	50	38	29	38	56	41	58
Ball Mustard *Neslia paniculata* (L.) Desv.	A.	58	39	35	39	23	11	24	47
White Clover *Trifolium repens* L.	P.	14	28	12	18	61	66	65	95
Wild Oats (clearly under-recorded) *Avena fatua* L.	A.	25	44	35	39	31	0	0	10
White Sweet Clover *Melilotus alba* Desv.	B.	22	39	29	21	15	0	12	47
Perennial Sow Thistle (smooth) *Sonchus arvensis* L. var. *glabrescens* Günth.	P.	6	22	12	25	31	11	65	48
Stinkweed. Pennycress. Frenchweed *Thlaspi arvense* L.	A. or W. A.	25	22	3	28	39	22	18	42
Tumbling Mustard *Sisymbrium altissimum* L.	A. or W. A.	8	28	18	40	15	33	18	37
False Flax (not distinguishing the two common species) *Camelina* spp.	W.A.	30	33	12	18	8	0	12	37
Red-seeded Dandelion (underrecorded) *Taraxacum laevigatum* DC.	P.	14	22	9	36	31	0	24	21
Flixweed *Sisymbrium Sophio* L.	A. or B.	25	39	29	36	15	22	29	47

TABLE II.—ADVENTIVE AND ESCAPED PLANTS APT TO BE WEEDY—*Continued*

Names in Order of General Prevalence	Duration	Frequency Percentage by Meridians							
		120	119	118	117	116	115	114	113
Blue Bur (including possibly some native) *Lappula echinata* Gilibert	A.	11	22	18	25	15	0	18	10
Indian Mustard *Brassica juncea* (L.) Cosson	A.	3	22	12	14	8	0	6	31
Alfalfa *Medicago sativa* L.	P.	22	33	6	10	0	0	0	0
Yellow Sweet Clover *Melilotus officinalis* (L.) Lam.	B.	14	17	9	14	8	0	6	10
Canadian Blue Grass *Poa compressa* L.	P.	6	22	6	10	15	22	18	0
Common Chickweed *Stellaria media* (L.) Cyrill	A.	0	6	0	14	8	33	18	26
Couch Grass (sight records often open to doubt) *Agropyron repens* (L.) Beauv.	P.	3	11	6	7	0	0	6	47
Wild Mustard *Brassica arvensis* (L.) Ktze.	A.	3	11	0	14	8	11	6	37
Hemp Nettle *Galeopsis Tetrahit* L.	A.	0	0	6	7	15	33	23	16
Canada Thistle *Cirsium arvensis* (L.) Scop.	P.	3	6	9	10	15	11	0	10
Red Clover *Trifolium pratense* L.	B.	3	17	3	4	0	11	6	26
Rye *Secale cereale* L.	A. or W.A.	.....	.....	.....	Volunteers wherever cultivated.				
Common Groundsel *Senecio vulgaris* L.	A.	.....	Beaverlodge	.....	Falher Peace River	McLennan	.....	.....	Westlock
Flax *Linum usitatissimum* L.	A.	.....	.....	Where introduced in crop or along railways.					
Wild Parsnip *Pastinaca sativa* L.	B.	Baldonnel North Pine	Hythe	Fairview	Donelly	High Prairie			
Russian Thistle *Salsola Kali* L. var. *tenuifolia* G.F.W. Meyer.	A.	Pouce Coupe 1934	Beaverlodge 1929	Spirit River 1929	Peace River 1934				
Scentless Chamomile *Matricaria inodora* L.	A.	Fort St. John Taylor Flat	Beaverlodge	Fairview	Peace River	McLennan			

Oak-leaved Goosefoot *Chenopodium glaucum* L.	A.	Dawson	Hythe Beaverlodge		Watino Along Peace River (John Macoun, 1875)				
Absinthe. Common Wormwood *Artemisia Absinthium* L.	P.	Taylor Flat		Bluesky Fairview					Westlock
Hare's-ear Mustard *Conringia orientalis* (L.) Dum.	A.	Pouce Coupe	Hythe	.....	.....	.....	.....	.....	Legal Athabaska
Low Spear Grass *Poa annua* L.	A.	Dawson Creek	.....	.....	.....	High Prairie	.....	Fawcett	Westlock
Spiny Annual Sow Thistle *Sonchus asper* (L.) Hill.	A.	Fort St. John Baldonnel	.....	.....	Peace River	.....	.....	.....	Westlock
Sheep Sorrel *Rumex Acetosella* L.	P.	.....	Beaverlodge	.....	.....	.....	.....	.....	Athabaska dist.
Ox-eye Daisy *Chrysanthemum Leucanthemum* L.	P.	Hythe	.....	.....	.....	.....	.....	.....	Athabaska dist.
Caraway *Carum Carvi* L.	B. or P.	.....	.....	.....	.....	High Prairie	.....	Barrhead	Athabaska
Green Foxtail *Setaria viridis* (L.) Beauv.	A.	Fort St. John	.....	Fairview	Peace River				
Redroot Pigweed *Amaranthus retroflexus* L.	A.	.....	.....	.....	Watino Peace River				
Moroccan Toadflax (garden escape) *Linaria maroccana* Hook.	A.	Fort St. John	Beaverlodge						
Manitoba Maple. Box Elder *Acer Negundo* L. (spread from planting)	P.	Beaverlodge	.....	.....	Peace River				
Phacelia (garden escape) *Phacelia tanacetifolia* Benth.	A.	Montney Baldonnel							
Mouse-ear Chickweed *Cerastium vulgatum* L.	P. or B.	.....	.....	.....	Peace River	.....	Widewater		
Canary Grass *Phalaris canariensis* L.	A.	Dawson Creek Pouce Coupe							
Tumbleweed *Amaranthus graecizans* L.	A.	.....	.....	.....	Watino Peace River				
Ribgrass. Buckhorn *Plantago lanceolata* L.	P.	Rose Prairie North Pine							
Prickly Lettuce *Lactuca Scariola* L.	A. or W.A.	.....	.....	Spirit River	Peace River				
Black Medick *Medicago lupulina* L.	A. or W.A.	.....	Beaverlodge	.....	Falher				
Hoary Cress *Lepidium Draba* L.	P.	.....	.....	Teepee Creek Grande Prairie					

TABLE 11.—ADVENTIVE AND ESCAPED PLANTS APT TO BE WEEDY—*Concluded*

Names in Order of General Prevalence	Duration	Frequency Percentage by Meridians							
		120	119	118	117	116	115	114	113
Asparagus *Asparagus officinalis* L.	P.	.....	Beaverlodge	.....	Peace River				
Common Annual Sow Thistle *Sonchus oleraceus* L.	.....	.....	Beaverlodge						
Yellow Goat's-beard *Tragopogon pratensis* L.	.....	.....	Beaverlodge						
Common Ragweed (one plant) *Ambrosia artemisiifolia* L.	.....	.....	.....	.....	.....	McLennan			
Yellow Lucerne (plot escape) *Medicago falcata* L.	P.	.....	Beaverlodge						
Tourneforts' Speedwell *Veronica persica* Poir. (V. *Tournefortii Gmcl.*)	A. or W. A.	.....	Beaverlodge						
Golden Marguerite (garden escape) *Anthemis tinctoria* L.	A.	.....	.....	.....	.....	McLennan			
Night-flowering Catchfly *Silene noctiflora* L.	A. or W.A.	.....	Beaverlodge						
European Field Pansy *Viola arvensis* Murr.	A.	.....	Beaverlodge						
Bladder Campion *Silene latifolia* (Mill.) Britten & Rendle	P.	.....	Beaverlodge						
Dog Mustard (the present farthest west and north) *Erucastrum gallicum* (Willd.) O. E. Schulz.	A.	.....	.....	.....	Brownvale				
Dill (one plant) *Anethum graveolens* L.	A.	.....	.....	.....	Peace River				
Buckwheat *Fagopyrum esculentum* Moench.	A.								
Rocky Mountain Bee Plant (one colony) *Cleome serrulata* Pursh.	A.	.....	Hythe						
Chess. Cheat (one infestation) *Bromus secalinus* L.									
Garden Orache (escaped from cultivation) *Atriplex hortensis* L.	A.	.....	.....	.....	Peace River				
Bird Rape *Brassica campestris* L.	W.A. or B.	.....	.....	.....	.....	.....	.....	.....	Athabaska

White Cockle (one infestation)..... *Lychnis alba* Mill.	B. or P.	.....	.....	.....	.....	.....	.....	.....	Athabaska
Round-leaved Mallow (a plant or two) *Malva rotundifolia* L.									Athabaska
Dame's Violet..... *Hesperis matronalis* L.	B. or P.	.....	.....	.....	.....	.....	.....	.....	Athabaska
Horseradish..... *Radicula Armoracia* (L.) Robinson	P.	.....	.....	Fairview					
Toadflax..... *Linaria vulgaris* Mill.	P.	.....	.....	.....	.....	.....	.....	.....	Clyde
Narrow-leaved Hawksbeard..... *Crepis tectorum* L.	A. or B.	.....	.....	.....	.....	.....	.....	.....	Athabaska dist.
Sheep's Fescue..... *Festuca ovina* L.	.....	Dawson Creek							
Dwarf Nettle (a few plants)..... *Urtica urens* L.	A.	.....	Beaverlodge						
Heartsease. Pansy (colony in garden showing every variation between this and *Viola arvensis* Murr.) *Viola tricolor* L.	.....	.....	Beaverlodge						

REVIEW OF WEEDS

(Following usual botanical sequence.)

Ferns. The few ferns, like bracken, etc., which are fitted for life in the open where they would affect agriculture, appear to be lacking entirely. Other ferns and the allied club-mosses occur in woodlands, and consequently were little seen.

Horsetails, scouring rush, etc. *Equisetum* spp. Seven species are known in the district. They are all moisture-loving plants, in most cases so restricted to wet situations that they do not interfere with crop production. Field horsetail (*E. arvense* L.) is a familiar cover of railway embankments where the substratum remains moist, and invades fields with faulty drainage. For this reason it was found more generally in the eastern half of the belt where natural drainage is commonly poor. At High Prairie it is a major weed problem. The gradual amelioration of pioneer conditions will go far to subdue such native weeds as this; and attention to good tillage and drainage will help at once.

Meadow horsetail (*E. pratense* Ehrh.), wood horsetail (*E. sylvaticum* Ehrh.), and scouring rush (*E. hyemale* L.), are less frequently troublesome to crops. All species however, probably share in responsibility for poisoning of horses eating infested hay, to an extent somewhat proportionate to their occurrence where hay is cut. There would seem to be less danger in pasture.

The horsetails can all be known as such when bearing their terminal spore-producing " cones " or spikes. The stems are jointed with or without whorls of slender branches; and these vegetative branches are on separate or on the same stems on which the spores are borne, and from perennial roots.

Junipers. *Juniperus communis* L. var. *montana* Ait. and *J. horizontalis* Moench. The junipers possess poisonous properties, but being mostly restricted to dry slopes, such as the southern exposures at Peace River and Taylor Flat, they cannot occasion much harm.

Cat-tail. *Typha latifolia* L. Except as it may be, like other water plants not here named, a nuisance of beaches and water channels, it is scarcely weedy. From summer resorts and water works of various kinds urgent calls for help against even such weeds are not unusual, and are baffling to fully meet.

Arrow-grasses. *Triglochin maritima* L. and *T. palustris* L. Included only because the first at least is demonstrated poisonous. Sheep and cattle eating a large amount at one time go down quickly and usually fatally as a result of hydrocyanic acid development from the plant.

Awnless Brome Grass. *Bromus inermis* Leyss. A valuable introduced grass extensively escaped and able to persist strongly by its creeping rhizomes. Its spontaneous distribution is about in proportion to its cultivation. Some thoroughness in tillage is necessary when it is to be suppressed.

A couple of native brome grasses are unable to persist long after breaking.

Chess (cheat). *Bromus secalinus* L. Reported but not seen in 1929, chess was found freely infesting a roadside near Donelly, September 14, 1934. No evidence was found of its presence in cropped fields adjoining; and care should be taken to prevent such spread. Chess, being a winter annual, is most troublesome where winter grains are more grown than they are here. Its hardy persistence where wheat has winter-killed, has lead many credulous folks to the fallacious idea that it is nothing else than degenerate wheat. It has made itself at home almost throughout temperate North America.

Low Spear Grass. *Poa annua* L. Oftenest troublesome in thin lawn turf and on drives. It springs up early, flowers and seeds before the customary weeding

practices would forestall it; and then when hot weather comes it browns and leaves the lawn unsightly. As an annual it would be no problem if prevented from seeding for a few years.

Canadian Blue Grass. *Poa compressa* L. Unlike the last this species has creeping perennial rootstocks which sometimes call for an extra stroke or two of tillage to clean it out of land. In lawns it also leaves bare patches after spring growth is over. As a pasture grass it is relished by animals.

Kentucky Blue Grass. *Poa pratensis* L. An important range grass prevalent throughout in a variety of types, and tending to persist in cultivated fields by its perennial rootstocks. It is native, whereas the two preceding *Poas* are introduced.

Couch Grass (quack, twitch, etc.). *Agropyron repens* (L.) Beauv. This tenacious invader of so much good eastern land, is spreading in the West, has already a strong foothold in the Athabaska district, and has increased some in the Grande Prairie and other districts since 1929, when it was found at Beaverlodge and near Grande Prairie. Inability to stop and distinguish always between patches of this and brome or sweet grass, precluded any exact or reliable estimate of its prevalence.

Quoting from *Grande Prairie Weeds*: "It spreads both by seeds and by its tough, creeping rootstocks, which are capable of throwing up shoots wherever space can be found for their occupancy. Patches soon fill up closely, and in the course of a few years may even become sod-bound, shallow-rooted and of stunted growth; but any segment of rootstock carried away from the patch by implements or otherwise, is instantly rejuvenated. Patches should be carefully dug up, or treated with some sterilizing agent such as fuel oil or salt, or with the newer chlorate herbicides, repeating until growth ceases to reappear." General infestations are usually handled by the "working out" method of tillage, although the "smother" line of attack has its advocates, some relying on smother crops over a period of two years if necessary, and others on tillage to keep growth beneath the surface, as in fighting sowthistle. Any method is laborious, and without ideal weather conditions will only accomplish a certain measure of control, not eradication.

Western Rye Grass or slender wheat grass, and Awned Wheat Grass. *Agropyron trachycaulum* (Link.) Malte. vars. The inclusion of these native grasses in a weed list may be open to question, the first, at least, being one of the valuable forage crops of the west. It is only when it remains in a following crop, which it is not seriously given to doing, that it is a weed.

Rye. *Secale cereale* L. Occasionally mixed in a succeeding crop, which matters more in districts where this crop might be winter wheat.

Wild Barley (squirrel-tail). *Hordeum jubatum* L. The presence of this very prevalent native grass is sometimes, but not necessarily, an indication of alkalinity; it was found in particular abundance, and was said to be increasing along roadsides in the Grande Prairie region. It also prevails in grazing lands and to a less extent with crops. Infested meadows can be grazed to good advantage in spring, not only for its pasturage value, but for its setback; but once the awns are formed serious harm may result to stock from penetration of these into the gums, eyes, etc. The problem of keeping fields clean will be much simplified if attention is also given to waste ground, sloughs and shores, which otherwise continually re-seed land adjacent.

Wild Oats. *Avena fatua* L. A little less than fifty records appear in the notebooks, which considering the nature of the surveys, is bound to be a less complete recording than is obtained of weeds more easily distinguished from the crop. The Athabaska region, moreover, was seen earlier in the season, or en

route to the Peace, mostly from the train. North of the Peace river in British Columbia no wild oats was seen, and it is hoped none was there to be seen. One specimen at Baldonnel exhibited certain wild oat characters, but has since been shown to be an example of the so-called false wild oats, a fatuoid mutant of the oats of cultivation. Fields in the Pouce Coupé district are already in some cases polluted with wild oats, and outside the Block it is quite general. Near Falher a field was seen where the crop, barley, and wild oats seemed about equal in amount. At the present time this pest is no doubt entitled to be known as the " worst weed " in the area as a whole; and will decrease little while grain growing holds the premier place in agriculture.

Methods of control vary with locality, and have not been formulated as yet with any very special reference to the Peace River problem. As this is an annual the emphasis is on means of avoiding seeding and seed distribution, securing germination at a time favourable for destruction, and choosing crops advantageous for control. Recent studies in the West promise important advances.

Wild Oat-grass. *Danthonia intermedia* Vasey. Usually confined to poor, hilly tracts, which poorly repay farming effort.

Rough Hair Grass. *Agrostis scabra* Willd. Increases sometimes in hay meadows to the detriment of quality.

Bent Grasses (red top, etc.). *Agrostis* spp. If present, rather scarce.

Marsh Foxtail. *Alopecurus aequalis* Sobol. (*A. aristulatus* Michx.) Occurrence is usually in places rather wet for cropping.

Timothy. *Phleum pratense* L. While not equal here to some native and other grasses for hay, this outstanding hay plant of other regions is extensively naturalized. Every trail and clearing doubtless received a quota of seed quite early.

Porcupine Grass. *Stipa comata* Trin. & Rupr. A native forage plant in dry situations, but a source of trouble when its sharply-pointed and awned fruits work themselves into the skin of animals. Feather bunch grasses (*S. viridula* Trin. and *S. columbiana* Macoun) are other species occurring, having smaller and less dangerous awned fruits.

Slough Grass. *Beckmannia Syzigachne* (Steud.) Fern. While confined mostly to wet spots of little value agriculturally in the West, its presence occasionally eastward may be an indication of some tendency to spread.

Sweet Grass. *Hierochloa odorata* (L.) Wahl. Scattered infestations noticed right across the belt. The deep perennial creeping rootstocks, establishing large patches of herbage, require deep and persistent tillage to subdue them.

Canary Grass. *Phalaris canariensis* L. Found about railway yards at Dawson Creek and Pouce Coupé, 1934. An introduced annual, not likely to give serious trouble.

Green Foxtail. *Setaria viridis* (L.) Beauv. Seen at Fort St. John, Fairview and Peace River, and no doubt present in most settlements. Experience elsewhere would warn us to expect rapid increase and firm establishment wherever introduced. It is a very common impurity in commercial seeds, and should be watched for when buying, at least as long as the country remains comparatively free of it.

Water Arum. *Calla palustris* L. Noticed in the Athabaska district; growing in wet places, it is included here only because it is acrid poisonous.

Toad Rush. *Juncus bufonius* L. Not seriously weedy, although sometimes offering some competition on moist ground.

Nodding Wild Onion. *Allium cernuum* Roth. Growing on the drier soils; probably capable of tainting milk of cows eating it.

Asparagus. *Asparagus officinalis* L. Seen occasionally as a wayside escape.

Blue-eyed Grass. *Sisyrinchium angustifolium* Miller. May become quite plentiful in meadows, but otherwise not weedy.

Slender Nettle. *Urtica gracilis Ait.* Common throughout as a wayside weed; objectionable because of its stinging hairs, which set up a painful irritation of the skin.

Dwarf Nettle. *Urtica urens* L. Only seen at Beaverlodge; an introduction nowhere becoming very abundant. Also irritant like the last.

Pale Comandra. *Comandra pallida* A.DC. Widespread on light, dry soils. Some at least of the members of the family are parasitic on the roots of other plants, but otherwise would not be called weedy.

Dwarf Mistletoe. *Arceuthobium americanum* Nutt. This was seen at Dawson Creek, parasitic on branches of lodgepole pine.

Western Dock. *Rumex occidentalis* S. Wats. Without closer examination than was usual, it is not certain that some of the records may not have been curled dock (*R. crispus* L.), for which there is, however, no authentic record. Western dock is native, and, unlike curled dock, grows on wet waste land more than in crops.

Pale Dock. *Rumex mexicanus* Meisn., and Golden Dock, *Rumex maritimus* L. var. *fueginus* (Phil.) Dusén. Natives growing in waste places, damp meadows and on slough margins.

Sheep Sorrel. *Rumex Acetosella* L. On the railway at Beaverlodge, and reported in the district. Likely to become more widely introduced. Reproducing by perennial creeping rootstocks as well as by seed; and being more tolerant than the crop, of acid or other poor soil conditions, sometimes becomes the prevailing vegetation. Application of fertilizers, especially nitrogen, will often correct conditions and so decrease its amount.

Pale Persicary. *Polygonum lapathifolium* L. var. *salicifolium* Sibth. Noticed at Berwyn; evidently not the real weed which its eastern representatives are in some localities. Lady's thumb, reported in 1929, but not yet seen, may have been this weed.

Wild Buckwheat. *Polygonum Convolvulus* L. Sometimes also called black bindweed from its habit of twining for support about the crop it infests. Present in the newest of new settlement in crops and everywhere, apparently profiting by the absence of so many weeds of older farms, and by the imperfect tillage of rough ground. Its seed is a very common impurity of grain sown, and makes up a great deal of the bulk of screenings. A cropping system which allows of regular cleaning crops is essential to keep it in check; and being an annual, prevention of seeding is all important.

Knotgrass. *Polygonum* spp. Both the low small-leaved *P. aviculture* L., and the more upright growing, larger leaved *P. erectum* L., occur freely. The former has a special liking for dooryards, while the other frequently forms a leafy border to trails, but neither to the exclusion of the other. As they cover surfaces that would often be bare or only sparsely grassed, they cannot be greatly objected to. They are annuals and probably both introduced.

Buckwheat. *Fagopyrum esculentum.* Moench. Sparingly persisting after cultivation.

Strawberry Blite. *Chenopodium capitatum* (L.) Asch. A native weed of the goosefoot family, differing from others in the large red berry-like fruit glomerules. It was especially frequent in the newer parts on recent clearings, but scarcely ever appears in any numbers in long-settled districts. The somewhat similar maple-leaved goosefoot (*C. hybridum* L.), also a native annual, occurs in waste places.

Oak-leaved Goosefoot. *Chenopodium glaucum* L. Usually confined to saline areas, or appearing in yards. Noticed half a dozen times in the western half of the belt. Goosefoot (*C. rubrum* L.) is in a few similar saline places at Peace River, etc.

Lamb's Quarters. *Chenopodium album* L. In the West better known as pigweed. An introduced annual, very prevalent in arable land if allowed to seed freely, as it has every opportunity to do under a system of extensive grain growing. Not only in crops, crowding them seriously, but in gardens, yards, and by waysides.

Spear-leaved Goosefoot. *Monolepis Nuttalliana* (Schultes.) Greene. Occasional in somewhat alkaline spots, and at times a crop weed right across the belt.

Russian Pigweed. *Axyris amarantoides* L. First noticed near Winnipeg, in 1886, this introduced annual has spread westward, and somewhat less strongly eastward, until now it is known from about all provinces. It was conspicuous in the Grande Prairie district in 1929, and illustrates very well at the present moment the penetration of a weed into a new region. From beyond Edmonton to the Peace River Block the degree of infestation is progressively lower. While invading and crowding crops considerably, this is even more an occupant of waysides and waste land, where it gives an appearance of untidiness. As it is a prolific seeder, prevention of maturing of seed is of prime importance.

Bug-seed. *Corispermum hyssopifolium* L. A native annual reported by John Macoun in 1875, from " saline springs along Peace R. above the Smoky R." Occasional in vacant lots in western cities.

Spreading Orache. *Atriplex patula* L. and var. In both narrow-leaved and halberd-leaved forms, occasionally seen in waste places, particularly under saline conditions. Rather like lamb's quarters, but usually less erect and somewhat widely branched.

Garden Orache. *Atriplex hortensis* L. At Peace River freely escaped from a garden. From Winnipeg to Edmonton a familiar escape from European immigrants' gardens; less often seen east of the prairies.

Russian Thistle. *Salsola Kali* L. var. *tenuifolia.* G. F. W. Meyer. In 1929 reported only from Spirit River and Beaverlodge; now six records from Peace River to the Peace River Block, but none from there over the long stretch out to the prairies. It is a pest of the lighter soils and dried-out areas of the West particularly; and in the North may spead but little away from railway gravel and some light waste land. It is an annual and a tumbleweed, needing chiefly to be prevented from distributing its seeds. In the half century or more since its introduction to South Dakota it has had almost unparalleled publicity as a weed. More recently it has been pretty well accepted as an inevitable accompaniment of continued drought conditions, under which it may even be turned to account as an emergency feed if grazed or cut for storage before becoming prickly.

Redroot Pigweed. *Amaranthus retroflexus* L. One distinct infestation in truck crop at Peace River, and also seen at Watino. This European annual may be expected to spread, as it has quite seriously in older parts of Canada, if the present outbreaks are allowed to come to seeding year after year. It is a coarse, unsightly weed.

Tumbleweed. *Amaranthus graecizans* L. What has been said of the one *Amaranthus* applies largely to the other, although the latter is less upright and successful in crop competition.

Common Chickweed. *Stellaria media* (L.) Cyrill. Collected by John Macoun as early as 1872. An introduced annual, which invades gardens and fields to a serious degree in longer settled country. Several native plants of the genus, although perennial in habit, are nevertheless ill adapted to survival on farm land.

Common Mouse-ear Chickweed. *Cerastium vulgatum* L. Noticed only in Athabaska district, at Widewater on Lesser Slave Lake and at Peace River, but likely to become more widespread. An Old World weed of lawns, etc., perennial in habit. Field chickweed (*C. arvense* L.) and nodding chickweed (*C. nutans* Raf.) are natives of little account.

Bladder Campion. *Silene latifolia* (Mill.) Britten & Rendle. Reported from Beaverlodge. A strongly rooting perennial which should be kept out as long as possible. Commercial seeds are common carriers.

Night-flowering Catchfly. *Silene noctiflora* L. Found at Beaverlodge, and on record from the Lesser Slave Lake district. Noxious under most weed legislation, and likely to be more widely introduced. Annual.

White Cockle. *Lychnis alba* Mill. Considerably resembling the catchfly, both in plant and seed, the latter frequent impurities in clover seed. White cockle is biennial or perennial in habit, and the more difficult one to clear out of the land. One patch seen in the town of Athabaska.

Red Baneberry. *Actaea rubra.* (Ait.) Willd. Most frequently observed in the Peace River Block. A white-fruited specimen also seen. A specimen in the Division of Botany Herbarium, collected by Miss J. Bostock at Peace River, in 1926, has been identified as the western *A. arguta* Nutt. The baneberries are restricted to thickets or woodland, but are here noticed because poisonous.

Larkspur. *Delphinium scopulorum* Gray var. *glaucum* Gray. Widespread and sometimes abundant, and some species important as causing a fatal poisoning of cattle where they prevail. The related poisonous *Aconitum* suspected in 1929, has not been proved to be present in the settled areas.

Prairie Crocus (pasque-flower). *Pulsatilla ludoviciana* (Nutt.) Heller. This handsome spring flower of the entire West is acrid poisonous, and is also accused of causing the death of sheep grazing upon it, by the formation of balls of felt in the stomach from the hairs clothing the stem.

Several species of the related *Anemones* are native, but all of minor importance as weeds although remaining in untilled land.

Small-flowered Buttercup. *Ranunculus abortivus* L. Occasionally seen. Like so many members of the family, acrid poisonous.

Celery-leaved (or cursed) **Buttercup.** *Ranunculus sceleratus* L. Around a slough at Hythe, and recorded from Lesser Slave Lake district by Brinkman. Poisonous, as probably also some seven or eight other native *Ranunculus.*

Tall Buttercup. *Ranunculus acris* L. This introduced buttercup is the one species likely to show really weedy properties. As in the East, it thrives in

meadows and pastures, although as yet mostly in patches near the railway. The twenty-two records obtained were progressively less frequent until left behind at McLennan. It was reported but not seen in 1929. It is avoided, like most buttercups in grazing, because of its acridity.

Marsh Marigold. *Caltha palustris* L. Seen occasionally from Grande Prairie district eastward, and the white marsh marigold (*Caltha natans* Pall.) at Rose Prairie; both probably of general occurrence along slow streams. Reputed poisonous.

Golden Corydalis. *Corydalis aurea* Willd. *C. sempervirens* is also recorded from Lesser Slave Lake district, but in the absence of flowers and critical examination, all observations were credited to the first named, especially as occurrence was regularly in its type of habitat, on land left bare after burning, and in garden or other cultivated ground. Most frequent in recently opened country. It is considered to have poisonous properties.

Wood Whitlow-grass. *Draba nemorosa* L. Recorded by J. M. Macoun from north of Dunvegan, and by Raup from a meadow near Dawson Creek. A specimen collected September 14, 1934, from the railway near McLennan, is the variety *leiocarpa* Lindbl., with glabrous pods. These both at times assume the role of weeds, their winter annual habit facilitating the maturing of seeds.

Stinkweed (or pennycress, also Frenchweed). *Thlaspi arvense* L. Many fields in the intensive grain-growing areas are already thoroughly polluted with stinkweed, and only the closest vigilance will keep other fields free of it for a time. It is imperative to prevent seed dispersal. Diversification of crops to allow of suitable rotations is to be encouraged. It is a good measure of insurance to have grain always so well occupying the ground that stinkweed plants are dwarfed, and unable to produce more than a minimum of seed beneath the crop. If seed is present the weed is very quick to fill up any thin or patchy place. Although chiefly an annual, some plants always winter over and are ready to shed seed at most inconvenient dates.

Peppergrass. *Lepidium apetalum* Willd. Other similar species if present, were not distinguished. Common by roadsides, and in western grain fields, and in lighter soils right through the North. The rosette of leaves, and the roots which carry it through the winter, easily slip by the cultivator in the case of merely " stubbling in " crops. Indigenous and propagating by seed only.

Hoary Cress (broad-leaved peppergrass). *Lepidium Draba* L. A specimen was received from Teepee Creek in 1928, and the weed was seen near Grande Prairie in 1929. It is a very persistently rooting perennial, not often displaced where it has once gained a foothold. It has been known and spreading in the Prairie Provinces since 1896. A small infestation discovered at Ottawa in 1930, has increased in area despite digging up and applications of sodium chlorate as so far tried.

Shepherd's Purse. *Capsella Bursa-pastoris* (L.) Medic. Although introduced, this weed appears to be always present from the earliest settlement. It is especially common in the Grande Prairie and Peace River Block areas, and at Beaverlodge is considered to be as serious a pest as almost any of the more noxious weeds. As a winter annual, it is ready to get under way early in the spring and before the farmer is thinking of weeds, and from then until fall a succession of plants is producing an astonishing amount of seed. The plant too, while producing only an annual tap-root, keeps a rather tenacious hold on the soil when weeded. The remedy, theoretically, is to prevent seeding and to secure germination of the seeds already in the soil as far as possible, but unfortunately that cannot usually be at all completely.

False Flax. *Camelina* spp. Both *C. sativa* (L.) Crantz and *C. microcarpa* Andrz. are present, but no attempt was made to learn the proportion of each. Fields in the neighbourhood of Dawson Creek and Beaverlodge have become particularly over-run. Although winter annual in habit in a spring wheat district, false flax is becoming a serious problem. Without the utmost effort to prevent dispersal of the seed it will soon be much more widespread. It is abundant also in the Athabaska valley.

Ball Mustard. *Neslia paniculata* (L.) Desv. One of the chief mustards in all the grain-growing parts. Adventive and annual and bound to pollute the soil with seed if grain is grown too regularly. It is not nearly the same problem in the more diversified cropping of Eastern Canada. Newer infestations should be hand-pulled before seeds are formed. Shed seed in a crop should be induced to germinate by harrowing after removal of the crop, and again in the spring some time before ploughing.

Wild Mustard. *Brassica arvensis* (L.) Ktze. Still much more abundant in the outer Athabaska region than farther along, but evidently increased since 1929. In view of its record in older farming country, no effort should be spared to retard its seeding down of this new land.

Indian Mustard. *Brassica juncea* (L.) Cosson. Probably the commonest of the mustards of this genus, but less a crop than a wayside weed, although often plentiful in crops. More prevalent westward than in Eastern Canada. Annual or winter annual; said to be introduced from Asia.

Bird Rape. *Brassica campestris* L. Recorded once at Athabaska, 1935. No doubt introduced with commercial seeds. Only occasionally serious elsewhere.

Dog Mustard. *Erucastrum gallicum* (Willd.) O. E. Schulz. Along railway at Brownvale, September 12, 1934. Until recent years* not recognized in Canada, although already distributed from the Atlantic to Alberta at least. This is the farthest west and north record to date. It is a weed of railway and roadside, but spreading from there, and capable of considerable inroads on grain crops. Annual, adventive from Europe.

Tumbling Mustard. *Sisymbrium altissimum* L. This noxious adventive annual or winter annual of such note in the Prairie Provinces, has spread quite generally through the North, but chiefly yet as a weed of railways and waste places. Its tumbling habit ensures distribution of the remarkably abundant seed.

Gray Tansy Mustard. *Sisymbrium Hartwegianum* Fourn. Fort St. John and occasionally throughout. Mostly confined to waste places. A tall native biennial.

Flixweed. *Sisymbrium Sophia* L. An introduced annual, or perhaps biennial weed of the tansy mustard type, which there is reason to believe is passing in Canadian weed literature quite generally as green tansy mustard. The latter is indigenous on the prairies, but apparently not common enough northward to be of consequence as a weed, whereas flixweed is everywhere across the three provinces and into the utmost settled land. Fields may be seen in the fall carpeted with the hoary rosettes prepared to winter over, and suggesting that this may yet be one of the worst of the mustards in grain-growing areas.

Hare's-ear Mustard. *Conringia orientalis* (L.) Dum. Five times recorded from end to end of the belt. Annual, introduced from Europe, and spreading in waste places and grain fields, mostly westward in Canada.

*Groh, Herbert. Some recently noticed mustards. Sc. Agr. 13: 722-729, 1933.

Wormseed Mustard. *Erysimum cheiranthoides* L. One of the worst of the native mustards. Common in grain fields farther south and east, where it may be largely introduced. Annual or winter annual reproducing freely by seed, which is a frequent impurity in farm seeds. The seed when present in any quantity in feed, makes it unpalatable and unwholesome to stock. Small-flowered prairie rocket (*Erysimum parviflorum* Nutt.) is indigenous and only occasionally becomes abundant in crops.

Marsh Cress. *Rorippa palustris* (L.) Bess. var. *glabrata* (Lunell.) Victorin. Occurring throughout in places usually too wet for thrifty crops.

Winter Cress (yellow rocket). *Barbarea* sp. Recorded 1929, but record not supported by any specimen.

Tower Mustard. *Arabis glabra* (L.) Bernh. One *Arabis* which figures occasionally as a minor weed. A native biennial.

Rocky Mountain Bee Plant. *Cleome serrulata* Pursh. A colony along elevator siding at Hythe, August 31, 1934; probably introduced here, although indigenous in Western Canada. An annual controllable by reasonable cultivation, or often requiring only hand-pulling.

Red Raspberry. *Rubus idaeus* L. var. *canadensis* Richards. The common red raspberry of the region, invading clearings but not long persisting with cropping.

Upright Cinquefoil. *Potentilla norvegica* L. var. *hirsuta* (Michx.) Lehm. (*P. monspeliensis* L.). A common annual. The seed is frequently present in timothy or clover seeds, and advantage is taken of a poor stand of crop to increase. Diffuse cinquefoil (*P. millegrana* Engelm), a related species, was found on burnt over land. Several other native *Potentillas* were common on undisturbed prairie, but are largely eliminated by breaking. Silverweed (*P. Anserina* L.) was frequent in wet situations.

Avens. *Geum macrophyllum* Willd. var. *perincisum* (Rybd.) Raup. and *G. strictum* Ait. The former apparently the more abundant; both objectionable in pastures or around the home by reason of their clinging hooked fruits. They are native perennials.

Agrimony. *Agrimonia striata* Michx. Seen at High Prairie and occasionally in the Athabaska district. A native perennial not seriously weedy but producing hooked fruits somewhat less clinging than the last.

Wild Roses. *Rosa acicularis* Lindl., and others. Certain of the roses persist in crops for a time after breaking. Besides persistence by the deep perennial rootstocks, they have coarseness to render them objectionable in a crop.

Western Choke Cherry. *Prunus demissa* (Nutt.) Dietr. Records obtained mostly in the western half of the belt. Bird cherry (*P. pennsylvanica* L.f.) was rather infrequently seen. The wilted foliage of the cherries develops prussic acid poisoning of cattle browsing on them.

Red Clover. *Trifolium pratense* L. Alsike Clover. *T. hybridum* L. White Clover. *T. repens* L. The clovers escape freely from cultivation, alsike clover evidently being better at home than the others, and red clover least so. Even when well naturalized none of these offers much resistance to removal when in the way.

Sweet Clovers. *Melilotus alba* Desv. and *M. officinalis* (L.) Lam. These two, especially the former, were found distributed wherever agriculture had introduced them, chiefly as volunteers and roadside weeds.

Alfalfa. *Medicago sativa* L. and Yellow Lucerne. *M. falcata* L. From the records it would appear that alfalfa is escaped only in the western part of the area, and presumably therefore only grown to any extent there. *M. falcata* is escaped sparingly from experimental plots to roadsides at Beaverlodge.

Black Medick. *Medicago lupulina* L. Only Beaverlodge and Falher specimens seen. In Europe this plant finds a place in agriculture, but in America is regarded only as a weed, and in some soils reproduces freely by seed.

Milk Vetches. *Astragalus* spp. Several species were noticed to be quite common on prairie. Some of them may be poisonous.

Locoweeds. *Oxytropis* spp. Some plants at least of the genus are responsible for the disorder of horses feeding upon it, known as "locoing." The commonly occurring *O. splendens* Dougl. is probably innocent of harm.

American Vetch. *Vicia americana* Muhl. One of the most characteristic elements of the native flora. Its contribution to grazing no doubt outweighs any weedy propensities it may have at times. The same may be said of the wild pea (*Lathyrus ochroleucus* Hook.). Tufted vetch (*V. Cracca* L.), if occurring, was not definitely distinguished. The latter is a common and persistent weed in land broken from sod in Eastern Canada.

Cranesbill (wild geranium). *Geranium Bicknellii* Britton. Common on burnt over clearings, but scarcely weedy. *G. Richardsonii* F. & M. also occurs sparingly.

Flax. *Linum usitatissimum* L. Sparingly escaped in the Peace River parts particularly. A native wild flax of perennial habit is not uncommon on dry exposed slopes.

Thyme-leaved Spurge. *Euphorbia serpyllifolia* Pers. On railway gravel at Peace River, September 12, 1934; an apparent introduction from farther south where it is indigenous, if not also here.

Jewel-weed. *Impatiens Noli-tangere* L. Occasional. In the East it has been found weedy in moist yards, etc., but this is unusual.

Manitoba Maple (box elder). *Acer Negundo* L. Seen a few times where introduced by planting, and tending to multiply. This tendency often makes it a nuisance around gardens in the East.

Round-leaved Mallow. *Malva rotundifolia* L. Seen only at Athabaska. A tough rooted and sprawling annual or biennial weed of gardens and yards in older settlement. Introduced from Europe.

European Field Pansy. *Viola arvensis* Murr. Well established in a field at Beaverlodge, August 29, 1934. In a garden here a colony of plants exhibited every degree of variation between this and *V. tricolor* L., suggesting that the whole stock may have derived from reversion of the garden pansy.

Many-spined Opuntia. *Opuntia polyacantha* Haw. Dry gravelly river bluff at Taylor Flat (Raup); Smoky River Mission (J. M. Macoun). Separated by hundreds of miles from its usual dry prairie habitat, this cactus is to be found only on certain arid slopes of the Peace where its vicious spines are not seriously in the way.

Great Willow-herb (fireweed). *Epilobium angustifolium* L. Compilation of records has shown this conspicuous native plant equal to, or second only to common yarrow in prevalence throughout the entire belt. It is especially noticeable where recent fires or clearings have opened up a tract. As a weed it is not to be considered noxious, and but for the drifting in of its tufted seeds, it

would not long appear in cultivated land. The related and much smaller northern willow-herb (*Epilobium glandulosum* Lehm. var. *adenocaulon* (Haussk.) Fern.) persists more or less in wet ground.

Evening Primrose. *Oenothera* sp. A number of times recorded in the Athabaska district, but only once or twice farther west. It was not determined whether *O. biennis* L. or *O. muricata* L. prevails. A stout native of North America, *O. biennis* is said to have become naturalized in the Old World, a reversal of the usual rule in weed migration.

Water Hemlock. *Cicuta occidentalis* Greene. There are scattered records from Athabaska to the Peace River Block. Both western and eastern species are deadly poisonous. Animals are most often poisoned in early spring grazing, when the fleshy roots pull up easily from the wet ground in which they grow, and a concentration of the toxic principle is present in the roots and young shoots. A very little is sufficient to cause death, and so rapidly that animals are usually beyond help when once symptoms are noticed. Grubbing out the plants in the infested parts of pasture, or fencing apart are necessary.

The bulb-bearing water hemlock (*Cicuta bulbifera* L.) was detected at McLennan, September 14, 1934. It is also poisonous.

Water Parsnip. *Sium suave* Walt. (*S. cicutaefolium* Schrank). "Apt to be confused with water hemlock, but much less, if at all, poisonous. Both have umbels of white flowers, but whereas the leaves of this are simply pinnate, those of water hemlock are doubly compound." Rather common throughout in water or wet borders of water.

Caraway. *Carum Carvi* L. Four records spread between Athabaska and the Peace River Block. Naturalized from Europe, and growing in patches near dwellings.

Wild Parsnip. *Pastinaca sativa* L. Records mostly in the western half of the belt. Naturalized from Europe or garden degenerate. The flowers and foliage said to be irritant to the skin of some. Cow parsnip (*Heracleum lanatum* Michx.), common throughout, is sometimes held under suspicion of being one or another of the poisonous members of the family. Its large merely lobed leaves, and broad umbel of white flowers should serve to distinguish it.

Dill. *Anethum graveolens* L. Found on dry slope at Peace River, apparently an escape from cultivation.

Bog Rosemary. *Andromeda Polifolia* L. From Lesser Slave Lake district. (Brinkman). Poisonous.

Androsace. *Androsace septentrionalis* L. Noticed only in the western part of the range; in one instance quite weedy, behaving like other free-seeding annuals over acres of a rather neglected dry field.

Spreading Dogbane. *Apocynum androsaemifolium* L. A stout perennial forming considerable patches invading the borders of fields. Both it and Indian hemp (*A. hypericifolium* Ait.) are poisonous in some degree.

Narrow-leaved Collomia. *Collomia linearis* Nutt. Rather commonly seen, and sometimes assuming the character of a field weed. Native annual.

Tansy-leaved Phacelia. *Phacelia tanacetifolia Benth.* Escaped at Montney and at Baldonnel, September, 1934, from seedlings of a flower assortment supplied by a Winnipeg seed house.

Blue Bur (stickseed). *Lappula echinata* Gilib. Scattered along the railway but weedy also in fields, and a nuisance owing to its burs in waste places and where sheep are grazing. At least one native species similarly causes trouble.

American Dragonhead. *Dracocephalum parviflorum* Nutt. A native appearing especially on new clearings or on burnt areas, and occasionally a crop weed.

Catnip. *Nepeta Cataria* L. Not seen, and included solely on the strength of a specimen collected by Prof. Macoun, in 1872, from somewhere between Lesser Slave Lake and Hudson Hope.

Black Nightshade. *Solanum nigrum* L. Beaverlodge garden, and Taylor Flat fields, September, 1934. Three-flowered Nightshade. *Solanum triflorum* Nutt. Taylor Flat, September 4, 1934; in fields with crops. Although not seriously weedy, both these nightshades are reputed poisonous. Notwithstanding this the fruit of black nightshade is preserved by some for food, and the plant is said, moreover, to have been used in the breeding of the well-known wonderberry.

Hemp Nettle. *Galeopsis Tetrahit* L. An introduced annual weed, mostly of waste places. Not noticed west of Beaverlodge vicinity.

Canada Mint. *Mentha canadensis* L. var. *glabrata* Benth. By means of its creeping perennial rootstocks it persists and even invades moist ground.

Purslane Speedwell. *Veronica peregrina* L. var. *xalapensis* Pennell. The variety prevailing here differs little in its behaviour as a weed of lawns and cultivated ground, from the weed of the East. It is an annual or winter annual, reproducing by seeds.

Tournefort's Speedwell. *Veronica persica* Poir. (*V. Tournefortii* C.C. Gmel.). Collected in garden, Beaverlodge, August 29, 1934. An annual or winter annual, introduced from Eurasia, and now to be found in various parts of Canada.

Yellow Toadflax. *Linaria vulgaris* Hill. Clyde, July 4, 1935. Not yet an important weed in Western Canada, but probably capable of becoming so there as it is in the East.

Moroccan Toadflax. *Linaria maroccana* Hook. Beaverlodge and Fort St. John, 1934. Escaped sparingly from cultivation.

Indian Paint-brush. *Castilleja miniata* Benth. Owl's Clover. *Orthocarpus luteus* Nutt. Rattlebox. *Rhinanthus Kyrollae* Chab. Lousewort. *Pedicularis labradorica* Houtlyn. Cow Wheat. *Melampyrum lineare* Lam. Some at least of the preceding are root-parasitic or saprophytic, but in no case otherwise of much consequence.

Plantain. *Plantago major* L. var. *asiatica* Decaisne. This variety, native northward, is in its range about what the common plantain introduced from Europe is in older Canada—a most annoying pest in lawns. Although spreading chiefly by seed, it persists by means of a perennial short rootstock from which shoots are produced, and it is in about the same class as dandelion for tenacity in lawns. When cultivation is possible plantain is no great problem; and ordinarily it is better to plough up a badly infested lawn that to treat the weed without.

Ribgrass (buckhorn). *Plantago lanceolata* L. Noticed only at Rose Prairie and North Pine. An introduced weed, likely to appear increasingly with use of inferior grades of seed. In habit similar to common plantain, and to be kept out by every means possible.

Northern Bedstraw. *Galium boreale* L. A common native plant that seldom remains where it would be weedy. A tangle of one of the reclining rough bedstraws was found, evidently introduced, at Athabaska. Lacking flowers or fruit the species remains uncertain.

Wolfberry. *Symphoricarpos occidentalis* Hook., and Snowberry *S. albus* (L.) Blake var. *pauciflorus* (Robbins) Blake. Both common and, like the rose, persisting for some time after breaking out of prairie. They occupy much space where allowed to remain on grazing land.

Wild Cucumber. *Echinocystis lobata* T. & G. A few times seen. Chiefly objectionable when over-running trees and shrubs with its smother of dense vines. Native and annual.

Bluebell (harebell). *Campanula rotundifolia* L. Sometimes in meadows, but of slight account as a weed.

Gumweed. *Grindelia squarrosa* (Pursh). Dunal. Indigenous in the West, and adventive eastward, indicating some degree of aggressiveness.

Goldenrods. *Solidago* spp. Of various species occurring, the Canada goldenrod (*S. canadensis* L.) or its local counterpart (*S. lepida* DC. and varieties), narrow-leaved goldenrod (*S. graminifolia* (L.) Salib. var. *camporum* (Greene) Fern.) and late goldenrod (*S. serotina* Ait.) are among those commonly included among weeds. They are pasture weeds chiefly persisting by means of strongly creeping rootstocks.

Wild Asters. *Aster* spp. Like the goldenrods, various asters persist more or less strongly in meadows, and for a time after breaking. Rayless aster (*A. angustus* (Lindl.) T. & G.), by some placed in the genus *Brachyactis,* appeared to be present only as a waif from its home on the prairies, as it was restricted to railway sidings at Peace River, where it was in some abundance on September 12, 1934.

Philadelphia Fleabane. *Erigeron philadelphicus* L. A not uncommon native; in Eastern Canada often a lawn and pasture weed of some importance. Perennial with a short rootstock; reproducing also by seed.

Canada Fleabane. *Erigeron canadensis* L. Widely distributed in the area, on cultivated and pasture fields on the lighter type of soil. Native annual.

Everlasting (cat's-foot). *Antennaria* spp. "Native perennial herbs, forming patches often to the exclusion of better herbage in pastures."

Great Ragweed. *Ambrosia trifida* L. Five times noticed in the Peace River district; one of these at Pouce Coupé. A coarse weed of waste places, native in the Middle East.

Common Ragweed. *Ambrosia artemisiifolia* L. McLennan, September 14, 1934. Native of North America but doubtless introduced here. A noxious annual crop weed in Ontario and other older settled regions. After harvest it comes on rapidly, and should be dealt with either by mowing or by shallow tillage before seed can be matured. Hand-pulling in the present instance, should suffice for some time to come.

The ragweeds are foremost among plants whose pollen, when inhaled, induces autumnal hay fever. Any territory, in as good a position as this to maintain and advertise its relative freedom from ragweed, should guard that asset.

Poverty Weed. *Iva axillaris* Pursh. Not seen, but reported as infesting a field near Beaverlodge. In parts of Saskatchewan and Alberta principally, poverty weed has baffled all attempts to control it in soils inclined to be alkaline or saline, and reduces the productivity of much otherwise good farming land.

Wild Sunflowers. *Helianthus* spp. With fewer species and these less abundant than on the western prairies, the sunflowers are not prominent as weeds here. Their perennial roots may withstand cultivation for a time.

Beggar-ticks. *Bidens cernua* L. Scattered in wet places throughout. Not often weedy except as its barbed fruits make it a nuisance.

Common Yarrow. *Achillea Millefolium* L. About the most widespread and abundant weed in Canada, and equalling, if not exceeding every other in this region. It is a native, and with exceptions, native weeds are not the worst we have to contend with. As land is brought under efficient cultivation yarrow usually gives way to crops. Its root system is shallow and readily worked out of the soil. In lawns it may have to be grubbed out, and patches left bare re-seeded. Another yarrow, A. *sibirica* Ledeb., with merely serrate, not dissected leaves, was rather commonly seen also.

Scentless Chamomile. *Matricaria inodora* L. Seven times noticed from McLennan westward to the Peace River Block. Adventive from Europe, but scarcely weedy. Golden Marguerite (*Anthemis tinctoria* L.) was escaped from a garden at McLennan.

Pineappleweed. *Matricaria matricarioides* (Less.) Porter. "This weed has spread from the Pacific slope where it is indigenous, and is becoming common in waste places right through to the Atlantic. It frequents the same sort of habitat as chamomile or stinking mayweed in the East, and until its rayless, green flower heads appear, it closely resembles that weed. The finely cut foliage is not, however, stinking but is rather distinctly pineapple scented."

Ox-eye Daisy. *Chrysanthemum Leucanthemum* L. Observed at Hythe and in the Athabaska district, and reported from the Lesser Slave Lake district. An introduced weed of pastures which becomes abundant to the point of taking complete possession in some eastern Canadian areas. The shallow rootstocks are not very resistant to cultivation.

Biennial Wormwood. *Artemisia biennis* Willd. This coarse unsightly weed is native throughout the West, and has spread eastward to become one of the two chief wormwoods in those provinces. It reproduces freely by seed, and maintains itself well in crops.

Absinthe Wormwood. *Artemisia Absinthium* L. Five times seen from north of Edmonton to Taylor Flat on the Peace River in British Columbia. Adventive and not often abundant.

Prairie Sage. *Artemisia frigida* Willd. On dry prairies through most of this belt. In the range country of southern Alberta, the presence of much of this plant is taken as an indication of over-grazing. It is not to be expected on the better grazing land of the North, nor to any extent on land being farmed. Four or five other *Artemisias* were found, some on arid slopes chiefly, others where they might interfere more with crops.

Common Groundsel. *Senecio vulgaris* L. Occasional from the Grande Prairie district eastward. An annual naturalized from Europe, and spreading freely by seed on cultivated and waste ground. A native ragwort, *S. eremophilus* Richards, is common in settlements, but not fitted to withstand agriculture long.

Canada Thistle. *Cirsium arvense* (L.) Scop. In 1929 this noxious intruder was seen only at Spirit River, and a patch was reported in addition in the Pouce Coupé district; thirteen records now indicate a distribution from end to end of the country surveyed, showing a steady invasion which may be expected to continue until the regrettable history of older sections is repeated here. Even now some effort to secure extermination of any patches that can be found, and a rigorous exclusion of contaminated seed grain, roughage, etc., would help to postpone the evil day when every crop will be produced at increased cost and trouble. Spread by the maturing of seed should be sedulously prevented, if no

more were done. Of Old Country origin, probably no weed in North America has been more consistently legislated against, and yet it is firmly entrenched in all the humid northern United States and Canada. A reasonable control is possible under suitable rotations, including cleaning crops, but scarcely under continuous grain-growing practice.

A coarse native thistle of curiously low habit, *C. Drummondii* T. & G. by name, was noticed chiefly westward. It probably would not long survive breaking of the prairie.

Narrow-leaved Hawksbeard. *Crepis tectorum* L. Clyde. July 4, 1935. Adventive from Europe and establishing itself in various parts of Canada. Annual or biennial in habit. Other native *Crepis* were seen in the Peace River Block.

Canada Hawkweed. *Hieracium canadense* Michx. Common throughout, but yielding readily to cultivation.

Common Dandelion. *Taraxacum officinale* Weber, and Red-seeded Dandelion. *T. laevigatum* DC. (*T. erythrospermum* Andrz.). Not ordinarily distinguished clearly except when seed was present, but at least a fair proportion was of the latter usually overlooked species. These ubiquitous alien nuisances of lawn and meadow were especially conspicuous in the whole Athabaska district, perhaps, however, owing to the earlier date of that survey, as well as to highly favourable moisture conditions. The strong deeply anchored fleshy taproot, and the parachuted fruits ensure an entrance and hold that are hard to combat. Neither deep spudding, a laborious operation, nor chemical sprays, which need repeating oftener than most have patience for, nor any special treatment, has proven all that could be desired. Fields that are under a systematic rotation of crops can be kept fairly clean; and when a permanent sod or lawn has become badly over-run, it is simplest in most cases to break up and clean for a fresh start, depending then on the best obtainable sward to resist or delay reseeding from neighbouring sources.

Yellow Goat's-beard. *Tragopogon pratensis* L. Beaverlodge, August 29, 1934, on railway siding. A biennial locally common in other parts where introduced.

Blue Lettuce. *Lactuca pulchella* (Pursh.) DC. Of fairly common occurrence in patches, and among the more noxious of native plants. Its creeping rootstocks and plumed seeds both give it an advantage in propagation. Infested fields may be ploughed and put under cultivated crops for a year or two.

Prickly Lettuce. *Lactuca Scariola* L. Seen at Peace River, September 13, 1934, and at Spirit River. Wherever introduced a weed of yards and vacant lots primarily, and spreading thence often in dense stands.

False Dandelion. *Agoseris glauca* (Pursh.) Dietr. Having the appearance of a weed, but seldom surviving the breaking of its native prairie.

Perennial Sow Thistle. *Sonchus arvensis* L. One specimen taken at Falher, September 14, 1934, was very slightly glandular, and may be the one above named which prevails in Eastern Canada. All others examined were smooth and belong to the variety *glabrescens* Wimm. & Grab., the prevailing sow thistle on the prairies, neither, however, being excluded in the other's range.

For something like sixty years this most heralded of all our weeds has been in Eastern Canada, and during the latter half of this time most of its spread in Western Canada has taken place. The trend of spread has been always northwestward from its commencement in the Red River Valley of Manitoba, following its moisture preferences, which are quite tolerable for its needs in the Peace River area. In 1929 doubt was expressed locally as to its

arrival yet, but plants were discovered at Wembley and Elmworth; now some twenty records have been secured in the Peace River part of the survey. It will soon be all too general unless the utmost vigilance is exercised to detect and stamp out each incipient plague spot.

Greatest trouble is always to be expected in the heavier or better types of soil, especially if inclined to be badly drained. Small new infestations should be handled, as in the case of couch grass, by careful up-rooting, or by means of chemicals, or if preferred by covering with building paper until smothered. On larger areas the generally accepted principle is to starve out the larger root-stocks by depriving them continuously of foliage, using such an implement as the duckfoot cultivator to maintain a " black " fallow. Along with this goes of necessity its elimination from badly infested fields, or grain crops which would allow the seeds to mature and blow over clean fields, and attention to wild lands, lake margins and undrainable tracts which so often render other efforts on farms fruitless.

Spiny Annual Sow Thistle. *Sonchus asper* (L.) Hill. Four times seen,—in the Athabaska, Peace River and Fort St. John regions. Introduced and sometimes noxious in older settlement. Common annual sow thistle (*S. oleraceus* L.) was only noticed at Beaverlodge. Both weeds are apt to be troublesome around gardens, more than in fields, but if allowed to seed can distribute themselves over cultivated ground generally.

DISCUSSION

Remembering how recently the Peace has become subject to change from without, it is not surprising to find the weed population still more largely of native species than is usual in weed surveys. They are first on the ground; those which cannot endure disturbance at once become restricted to bordering shelter, and those less exacting compete with crops and incoming weeds for space in the changing environment. The present survey, only incidentally recording plants not weedy, found about 25 per cent of all adventive; or eliminating those not weedy, nearly 40 per cent were such as have added themselves to the flora. Where grain growing has been followed longest the precentage is rapidly approaching that in the prairie grain belt.

The proportion of perennial species is higher among those indigenous than among introduced plants—66 per cent as against 33 per cent. The remainder are mostly annual with a few winter annual and biennial species. Except in rather few instances, i.e. sweet grass, blue lettuce, etc, these native perennials have not the aggressive qualities of their introduced rivals, the thistles, couch grass and others. Wild rose, biennial wormwood, *Symphoricarpos* and similar weeds, keep up, for a time, a losing skirmish of retreat from cropped land, while most components of the prairie sod surrender more promptly after breaking.

It is to be noted that the longer and more densely established among adventive weeds are practically all annuals or winter annuals. These include various mustards such as ball mustard, stinkweed, false flax and flixweed (*Sisymbrium Sophia* L.) which are now in possession of many fields and entire neighbourhoods; lamb's quarters, shepherd's purse, and wild buckwheat, which owe their universality not only to long presence, but also to efficient seeding habits and doubtless too much to the familiarity which breeds contempt; and above all, wild oats, which would have to be rated higher if not so liable to oversight in surveys, and is probably to be considered now the worst weed of the Peace River grain grower, and a serious menace to the enviable record in seed production to date. The principal exceptions to the rule above are the dandelions, common and red-seeded; and their stronghold is in sod, not so much in competition with crops. Such other perennials as Canada thistle, perennial sow

thistle, couch grass, etc., while more frequently seen than five years ago, are still commonly incipient outbreaks not yet spread generally to crops. Their time will be all too soon, but the freer-seeding annuals meanwhile crowd crops, and are only with difficulty kept from polluting the ground still further with seed.

Seriously increasing weeds of waysides, borders and waste places, are the native wild barley or squirrel-tail, Russian pigweed, Indian mustard, and pineappleweed, which last is at home on the Pacific slope.

Glancing farther down the lists one may recognize many notorious pests of other agricultural regions, still sporadic, but ready to repeat history here. Even dog mustard, not recorded in Canada until 1933, although for some years present in various provinces, finds here at Brownvale, north of the Peace River, a new northern and western extension of known range. Such weeds as wild mustard, tumbling mustard, night-flowering catchfly, bladder campion, blue bur, Russian thistle, chess, ribgrass, ragweed, and the annual sow thistles, among other weeds not singled out, are bound to find somewhere here, if not generally, the conditions congenial for an outbreak which, once under way, may well end opportunities still remaining for possible extermination.

Taking a broad view, the older settled Falher, Grand Prairie and Pouce Coupé districts show the greatest incursion and increase of weeds. The Peace River–Fairview district belongs with them, except that its native weed flora is distinguished on land sloping southward to the Peace River, by quite an element reminiscent of dry plains far to the south. In striking contrast with the well-wooded south bank of the river are the steep sun-smitten slopes opposite, rather thinly clothed with a vegetation which includes numerous wormwoods, wild onion, puccoon, juniper, and even cactus, as reported in a few places. Passing from any of these semi-open prairies to the wooded belts which separate them, or proceeding to the limits of settlement, especially in the Peace River Block, the weediness of the flora steadily becomes less pronounced. The High Prairie and Lesser Slave Lake extension of the survey found also chiefly native weeds, with the water-loving horsetails characteristic and troublesome.

It should be pointed out that many of the adventive species in the tables are here recorded for the first time; and also some of those indigenous, as also a few indigenous species not included because not weedy. In many cases, they were not here when Macoun and other early collectors passed through; and most collectors up until now have been more interested, as already pointed out, in studies of the unspoiled native flora. Of the plants in Table 1, 11 per cent are not in Raup's Catalogue, and in Table 2, 85 per cent; this is some indication of the dissimilarity between this largely agricultural survey and most previous explorations.

RECOMMENDATIONS

Under the auspices of any suitable farmers' organization, might be urged the immediate creation of a sort of vigilance board of representative farmers, and such others in official capacities as the district representatives of the two departments of agriculture, and the superintendent of the experimental substation for the Grande Prairie district, together with someone, perhaps a weed supervisor, to act as liaison officer. The duties of such a board would be, among other functions, to know what commerce may be distributing in the way of new weeds, and in the case of any unusual movement of seeds, such as relief grain, to promptly make any representations found necessary in the interest of safety. Every report of new or spreading infestation should be investigated, and treated, if necessary, as a potential, if not actual plague spot. The scope of action might be made large enough to include the setting up of co-operative or campaign attack upon a special local situation. It might bring its influence to

bear for the establishment of experimental and demonstration work in weed control within the district, as is being done already in places elsewhere. Already there are problems enough, both of prevention and cure, to tax the resources of an energetic officer, serving a board fully alive to the importance of conserving advantages not yet lost.

The existing weed inspection service should be given all possible backing, and kept at its best in personnel. Those concerned might observe whether any great advantage is to be found in the system followed in the Peace River Block, where inspectors report to police headquarters, instead of to the department of agriculture. While the punitive aspect need not be stressed, and the purpose should be, as always, to help the farmer with his weed difficulties, there would seem to be here a true relation with other maintenance of law and order.

Supporting all regulation and supervision must be the farmer's own conformity with the elementary demands of weed suppression—timely and thorough tillage, use of clean and plump seed of adapted varieties, avoidance of ill-balanced or single-crop farming, and when necessary, emergency effort against the occasional outbreak which may have developed owing to peculiar weather conditions, crop failure, or other unforeseen advantage over the crop. The farmer cannot afford to lose sight of the fact that the weed is nature's provision for reclaiming from tillage what is not being well maintained by tillage. What he holds, he holds by virtue of wise and diligent use—the only peaceable possession possible.

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